

## **DIS++ / HLA Frequently Asked Questions**

### **Last updated 22 April 1996**

The following list of questions and answers is provided in response to inquiries from the 14th DIS Workshop. Responses to the questions have been prepared through the coordinated efforts of the Workshop Steering Committee and the Defense Modeling and Simulation Office (DMSO).

This list of questions and answers is intended to serve the following purposes:

- a. Provide a consistent baseline of information regarding the current and future direction of Workshop and DMSO activities.
- b. Build a common understanding and support within the M&S community for the Workshop purpose and objectives.
- c. Provide the best information at the time of publication. New questions and revisions to answers may occur as results of ongoing activities reach completion.

Comments regarding this list may be provided through the DIS-STD-STGVIP reflector. See answer to question 43.

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## **HLA FAQ**

### **1. What will be included in the baseline definition of HLA? When will it be available?**

ANSWER: The baseline definition of the HLA is due to be released in August 1996, at the end of the prototyping period. It will include a capstone description of the HLA (a top-level summary of the basic architecture structure), the HLA rules (underlying technical

principles), the HLA Interface Specification between the RTI and the federates, the HLA Object Model Template, and an HLA Glossary. Accompanying the release of the baseline definition will be an initial set of supporting documentation, which will include descriptions of the HLA federation design and execution process, common test procedures, a security architecture for HLA, time management functions under the HLA, declaration management functions, use cases based on the AMG prototyping experiences, and other technical documents.

During the prototyping process, the AMG has developed prototype software for the HLA Runtime Infrastructure (RTI), the distributed operating system for an HLA federation. This has been produced under a spiral development scheme, with sequential releases of versions of the RTI software to the AMG members for testing in prototype federations (“proto-federations”), with feedback to the RTI developers folded into the next iteration and subsequent release. RTI version 0.3 is due to be released on 30 April, and version 0.4 on 15 July.

## **2. What is a federation? What is a FOM? What is FRED?**

**ANSWER:** A federation under the High Level Architecture (HLA) for modeling and simulation is a named set of interacting federates (simulations, C4I system interfaces, data collectors, etc.), with a common federation object model, and supporting Runtime Infrastructure software, that are used as a whole to achieve some specific objective.

A Federation Object Model (FOM) is an identification of the essential classes of objects, their attributes, associations, and interactions that are supported by a federation. The FOM is like a “contract” between the federates, describing the type of data they agree to share through the RTI during a federation execution. This data is specified in a manner prescribed by the Object Model Template, a tabular format which includes an object class structure, interactions, attributes, and a data dictionary.

As shown in the Federation Development and Execution Process diagram on the DMSO Web pages (<http://www.dmsomil>), the Federation Required Execution Details (FRED) are used in the preparation of a Federation Execution. FRED data is drawn from

- \* the FOM
- \* federation common components
- \* scenario information
- \* management requirements
- \* execution environment

FRED data is recorded in a specific format to be defined by the federation developers. This data will be used to supply information to the RTI Initialization Data (RID), to the Federation Test process, and to the federation execution. Any of the customers of FRED data may further reduce the data to a form more suitable for efficient runtime execution.

## **3. Will HLA be more than a software interface architecture?**

**ANSWER:** The HLA is more than an interface specification. It also prescribes an object model template for documenting the objects, attributes, and interactions which will be exchanged during a federation runtime execution, and a set of HLA rules or underlying technical principles which prescribe certain functionality for both federates (simulations)

and federations. In addition, the HLA specifies a Runtime Infrastructure (RTI), in effect a distributed operating system, which provides, through common software, certain services which formerly were the responsibility of the individual simulations.

**4. Is HLA more than an ALSP upgrade?**

ANSWER: Yes. Both ALSP and DIS have been successful in the application areas for which they were designed. The HLA is an attempt to capture the best ideas derived from experience with both ALSP and DIS, but with an eye to applying M&S to a broader set of applications, with increased potential for interoperability of different simulations and reuse of simulation components. The HLA is being designed to support a wider range of DoD M&S applications with more functionality than either ALSP or DIS alone.

**5. What does HLA add to current ADS/DIS capabilities? Have the additional capabilities been demonstrated?**

ANSWER: Currently, DIS is designed to support realtime, platform level simulations. HLA provides an added set of services to apply to a broader set of applications. These include time management services (for logical time simulations), declaration management services (for larger scale applications), and object ownership services (for added functionality). These are all services designed to support a wider range of users than currently supported by DIS technology, but who are seen as eventual users of future DIS++ as laid out in the DIS Vision. The additional functionality and interoperability provided by the HLA is being demonstrated through a series of prototype efforts under the direction of the DoD Architecture Management Group (AMG).

**6. When will a design document and functional description be available for the RTI?**

ANSWER: A top-level functional description of the prototype RTI was presented by members of the RTI development team (from Lincoln Lab and Mitre) at the 14th DIS Workshop. Copies of the papers and briefing charts are available on the DMSO HLA pages on the World Wide Web. Beyond the prototype stage, the basic design document and functional description for the reference implementation of the RTI (version 1.0) is expected to be developed following the baseline HLA definition release in August.

**7. Is the RTI open? How do I get a copy of the RTI? When will it be available outside the proto-federations? What will it cost to purchase? What will it cost to run?**

ANSWER: Prototype RTI software is being developed in support of the HLA definition process. The current RTI prototype is being used with a range of DoD simulations in a set of prototype federations ("proto-federations") directed toward verifying and refining the initial HLA definition. A baseline definition of the HLA will be released in August 1996, based on the work of the AMG. This baseline will be augmented by a set of supporting documents (test procedures, security architecture, development process description) which will be released by October. HLA supporting software, including the RTI, developed during the prototyping period will be updated to conform to the baseline HLA definition and made available for more general distribution and use as soon as possible following the August baseline. Plans are now being made for this release, and once they are in place we will publish them through the AMG and the DMSO home page. It is envisioned that this version will be government-owned freeware, available at no cost for use in adapting and developing new HLA-compliant simulations.

**8. What about the latency in the RTI (especially CORBA)? Can it support real time simulation?**

ANSWER: It is recognized that RTI latency and throughput are critical issues, particularly for real-time and faster-than-real-time simulations. A key part of the design process for the prototype RTI involves assessing the performance of the selected CORBA implementation with respect to these factors. Three of the prototype federations helping to refine the HLA include federates who previously used DIS, and they will be paying close attention to latency. Where CORBA performance is found to be inadequate, other mechanisms involving the direct use of UDP or TCP/IP protocols are being employed. The prototype RTI is intended to provide us the experience, test results, and insights necessary to allow the development of an operational RTI which meets user needs. The prototype RTI is leveraging techniques developed under the ARPA Synthetic Theater of War (STOW) program, and represent the most advanced approaches to large-scale distributed simulation applications demonstrated to date.

**9. Will the RTI require an executable like CORBA? What about the cost of CORBA? What about the stability of the CORBA standard?**

ANSWER: As indicated in the response to Question 8, decisions about how various RTI services are implemented are being made on a case-by-case basis, depending on the measured capabilities of the current CORBA software in the context of the overall RTI design. The RTI development team has adopted a commercial software development tool (ORBIX™) to produce the initial prototype of the RTI software. It presently is based on CORBA 1.0, with some custom modifications to enable multicasting. This choice was made to implement the widest range of RTI services as quickly as possible. It is felt that CORBA 2.0 will remove the dependence on specific vendors and will have the necessary stability to be used in RTI version 1.0. When the initial prototype implementation is completed with RTI version 0.4, an assessment will be made based on the RTI's then-current configuration. Possible recommendations include further development based on the initial model, the incorporation of some other CORBA implementation based on alternatives then available, or even development not using a commercial CORBA product. In many respects, this will represent a classic "make vs. buy" analysis. It is too early to project the outcome of this analysis, much less to speculate on the cost of off-the-shelf software components at that time.

**10. What is the RTI communications layer? Where does one get information on the communications layer?**

ANSWER: The RTI prototype implementation is using standard protocols such as UDP or TCP/IP, RSVP, and NTP. A "virtual network" layer is being implemented to isolate the RTI functions as much as possible from changes in the underlying communication mechanisms (such as IP, native ATM, or shared memory). The implementation is employing a number of techniques developed under ARPA's Real-Time Information Transfer and Networking (RITN) effort, such as the Consistency Protocol, to maintain overall distributed database consistency without demanding reliable delivery of each simulation state update. The results of this effort on the RTI prototype will be documented and should be available by October.

**11. Will HLA be sufficiently tested before transitioning to it?**

ANSWER: The HLA is being tested prior to the formal baseline definition through a series of prototypes. These provide a variety of conditions and test scenarios which address a range of potential DoD M&S applications. The AMG is developing common interface test procedures, which will be benchmarked against the experience gained through the AMG proto-federations. In all, more than 25 separate simulations and simulators ("federates") are being adapted or built to participate in the proto-federations. This will provide an initial cross-section of experience across a number of M&S application areas, from training to analysis to engineering models. Performance analysis of prototype implementations of the RTI and proto-federations will be conducted to develop necessary performance specifications for future infrastructure (e.g., RTI) development.

**12. What type of test will be used to evaluate the proto-federations and the RTI prototype?**

ANSWER: Performance testing will take place in different proto-federations, using a common performance measurement framework and a common interface test procedure. Each proto-federation is developing its own test plan for assessing the HLA for applicability to their applications. Feedback from the proto-federations on the testing procedures will be used to revise the test procedures as a supporting document to the HLA baseline definition. Emphasis will be placed on learning where within the proto-federations various latencies occur, as well as where throughput bottlenecks occur. This information will be used in recording "lessons learned" and in formulating recommendations for subsequent RTI development. In terms of the RTI, tests will focus on communications efficiency (in terms of minimizing communications overhead and communications redundancy), end-to-end latency, and overall throughput (attribute updates per second). Where attribute update filtering is employed, it is desirable that the RTI deliver all the relevant updates to the subscribing federates, with a minimum of extraneous or irrelevant information that must be discarded at the destination.

**13. Will the HLA be language neutral? Will the RTI? Will we always have to use C++?**

ANSWER: The HLA will be language neutral, since it is an architecture, independent of implementation language. In terms of the simulations within a federation, the only requirement is that they be described in terms of objects, attributes, and interactions, and that it conform to a standard (common) API. While it is an option for simulation developers, there is no intent or implication that the simulations must be implemented in an object-oriented programming language. The RTI is indifferent to how the federate-level services are implemented. In fact, current proto-federations refining the HLA under the AMG have been implemented in a wide range of programming languages, to include C, C++, Ada, MODSIM, Smalltalk, and even FORTRAN.

**14. Will multiple federations reduce interoperability?**

ANSWER: The HLA explicitly addresses interoperability among simulations in a single federation, not interoperability between distinct federations. However, the following implicit factors will encourage interoperability between federations.

\* The DIS++ Protocol Catalog will provide standard attribute and data definitions for all federations to use in their FOMs. All federations will be expected to use these

standard definitions to the maximum extent possible. This will ensure that common attributes (e.g. location, orientation) have common representation in different FOMs.

\* DoD will maintain an on-line library of FOMs in the Modeling and Simulation Resource Repository (MSRR). Such FOMs, or components of them, will be used to build new FOMs, thus encouraging interoperability between generations of FOMs.

\* At the 14th DIS Workshop, it was suggested that DIS++ develop core or "starter" FOMs that contain a standard set of attribute and data definitions for a particular simulation domain. Individual federations would use these as the basis for develop FOMs for specific federations. This will encourage common data representation between federations in the same domain.

\* The architecture does not encourage or discourage the use of specific FOMs. The idea of a set of reusable "master" FOMs is worth pursuing.

**15. Where will authority to change HLA reside? How is the DIS Workshop going to affect the development of HLA when it is being handed over to a contractor to develop?**

ANSWER: The HLA is not being handed over to a contractor to be developed. The HLA has been developed as a DoD product, and as such, during the baseline development, authority for changes resides at DoD. The body empowered to develop the HLA is the DoD Architecture Management group (AMG). The membership of the AMG was set by the DoD Executive Council for Modeling and Simulation (EXCIMS), based on nominations from the Services and DoD Agencies involved with M&S technology. Aside from individual name changes due to personnel changes in organizations, during the prototyping period (at least through August 1996), membership of the AMG is fixed. The current roster of AMG members is viewable on the DMSO Web pages (<http://www.dmsso.mil/wrkgrps/amg/amgmem.html>).

With the development of DIS++, certain components of the HLA (e.g., the Interface Specification, the Object Model Template, and the Protocol Catalog) are expected to be standardized through the DIS Workshop process. Once they become standards, the DoD will adopt these industry-based standards and future changes to the standards will become the responsibility of the standards body.

Common supporting software components (e.g., versions of the RTI, HLA interface modules) may be procured commercially, although they will be based upon government specifications, considering the work of the standards body.

**16. Is the HLA intended to be an IEEE standard?**

ANSWER: The DIS++ Steering Committee will form working groups that will develop draft IEEE standards based on the baseline HLA definition. These documents will be balloted to become an IEEE Standard.

**17. What will be standardized within HLA? How will the RTI be configuration managed and controlled, and by whom?**

ANSWER: It is expected that certain components of the HLA prescribed in the baseline definition will be standardized. The prototype RTI implementation presently being tested is



being developed and configuration managed by a Lincoln Laboratory/Mitre Corporation team under the guidance of DMSO and the AMG.

**18. Where is the master document?**

ANSWER: DMSO currently maintains the HLA documentation. All HLA documentation is available for viewing and downloading via the DMSO home page on the World Wide Web (<http://www.dmsso.mil/>). This includes the following:

- HLA Management Plan (version 1.6)
- HLA Interface Specification (version 0.4)
- HLA Application Programmer's Interface (API) (version 0.2)
- HLA Object Model Template (version 0.2)
- HLA Time Management Design Document (version 0.21)
- HLA Interface Specification Test Procedures (draft)
- Various supporting briefings, both technical and programmatic

Text documents are currently stored as Microsoft Word documents and as Adobe Portable Document Format (PDF). Briefings are generally in Powerpoint and in PDF, although several are viewable directly onscreen as well. In addition, at the bottom of most of the DMSO HLA Web pages there is an e-mail address ([hla@msis.dmsso.mil](mailto:hla@msis.dmsso.mil)) for submitting comments or questions about the contents of the pages. This address connects to personnel at DMSO who review the questions and either answer directly, or pass the inquiry to the proper person to provide a response.

**19. What is the schedule for HLA? What is the time table to have all sims running HLA? What is the transition plan for current DIS users?**

ANSWER: The DoD Modeling and Simulation Master Plan calls for a "review [of] all ongoing DoD M&S projects and/or programs by second quarter FY 1997 for feasibility of immediately adopting the HLA. If not immediately feasible, these reviews shall establish the date by which each program shall comply. If a specific M&S project and/or program is unable to comply with the HLA, the developing Component must report the reason(s) for non-compliance to the DDR&E." See answer to Questions 1, 6, and 7. [DoD 5000.59-P]

**20. Does the DoD mandate to use HLA apply to legacy models? When are models required to use HLA?**

ANSWER: The approved DoD Modeling and Simulation Master Plan, under Sub-Objective 1-1, prescribes the establishment of a common high-level simulation architecture "to which simulations developed by particular DoD Components or functional areas must conform." The Master Plan requires DoD components review their ongoing M&S programs by second quarter FY97 for feasibility of immediate HLA compliance. Legacy systems (i.e. those existing before the baseline definition of the HLA is promulgated) will be examined on a case by case basis. Basically, if a simulation expects to interoperate with another simulation in a meaningful way once the HLA is set in place, then the simulations will be required to become HLA compliant. If the simulation has no reason to interoperate with another simulation (i.e. it is fully a "stand-alone" simulation), then it could potentially operate without the HLA, although it would then have to provide for itself all the common infrastructure which the HLA makes available to simulations. We expect that the cost,

schedule, risk, interoperability, and reuse benefits which HLA compliance offers will be a compelling incentive for all Program Managers to adopt the HLA.

**21. How will DoD handle converting simulators from DIS to DIS++ so that simulators can talk to each other (i.e. some simulators will be using DIS and some using DIS++)?**

ANSWER: Under the HLA, each simulator is considered a federate. As such, bringing a simulator into compliance with the HLA will be treated just like any other federate. Current proto-federations involve both new and DIS-compliant simulators, so relevant data will be available soon. We expect commercial DIS to DIS++ adapters will emerge in the near future. See also questions 19 and 20.

**22. How much will it cost to convert legacy models to HLA? What are the potential sources of funding to convert legacy models to HLA?**

ANSWER: The cost to convert legacy models to HLA will vary on a case by case basis, depending on a number of factors such as the original engineering design of the model, the purpose for which it is being adapted, and the schedule desired for the adaptation. Under the HLA prototype effort, roughly 25 individual simulations (or “federates”) are being designed or adapted to the HLA. This provides a number of case studies which will allow a better assessment of the potential costs involved with HLA adaptation. The source of funding is again determined on a case by case basis.

**23. Won't the overhead required for HLA be excessive for small exercises?**

ANSWER: There is no reason to believe that the overhead for small exercises will be “excessive”. The proto-federations testing the HLA during the prototype development stage (prior to the release of the baseline definition in August) would all fall in the category of “small exercise” by DIS standards, so definitive data on this issue should be available soon. See also the answer to question 8.

**24. How will time synchronization issues be resolved?**

ANSWER: The HLA Time Management Design Document (available on the DMSO Web pages) details a number of time management services which are reflected in the latest version of the HLA Interface Specification. These services should provide the mechanism to support meaningful interactions among federates with different time management requirements. These services will all be tested by the HLA proto-federations prior to the release of the HLA baseline definition.

The federates and the RTI both rely on the existence of wallclock time that is provided by a service external to the RTI (and federate). Wallclock time is assumed to be available on each computing platform that supports a component of the RTI or a federate. The wallclock time access mechanism is not defined by the HLA. A given implementation of the RTI and all the federates that use that RTI must agree on the source of wallclock time for each type of computing platform and the mechanism used to coordinate wallclock time among all cooperating platforms. The mechanism and the degree of coordination are potentially important to the success of a given federation but are not constrained by the HLA specification.

**25. What about security in HLA?**

ANSWER: Security issues, particularly multi-level security in distributed exercises, transcends the architecture. DMSO is sponsoring the development of a security architecture as part of the HLA development program. The documentation which will support the HLA baseline definition will include a reference security architecture. A preliminary description of that architecture was presented at the 14th DIS Workshop, and it is expected that such technical interchanges will continue. At least one of the HLA proto-federations will perform classified exercises, and the goal is to define the HLA such that it does not preclude whatever is required to address multi-level security issues.

**26. How will data loggers/stealths/etc. function in a multi-cast environment?**

ANSWER: While multicast is available under IEEE 1278.2 profile 2, DIS exercises to date have used broadcast transmission services so data loggers and stealths are always receiving a stream of data on all players at all times during the exercise. When multicast is used, this will not be the case.

One of the Simulation Management PDUs in DIS 2.x commands simulations to store given data locally and transmit it to central loggers when commanded at the end of the exercise. Under DIS++ multicast operations, loggers will probably be assigned to log data on the multicast groups that have been subscribed to by the simulations physically located near it and to transmit this data to a central logger at the end of the exercise for merging and filtering. The stealth viewer can subscribe and unsubscribe just like any other simulation. Naturally, there will be some redundant data and it will have to be filtered out by the central logger. An HLA federation could have one data logger, but this may not be efficient in most cases. More likely, a data logging function will have to collect and collate data from multiple sources. Other more elegant solutions than the one described above are likely to be developed over time. More work is needed in this area, and the Synthetic Theater of War (STOW) program (one of the members of the AMG) is actively pursuing technical solutions.

**DIS 2.x**

**27. Why are current DIS systems being referred to as legacy systems?**

ANSWER: The term "legacy system" is applied to any simulation which will be designed prior to the baseline definition of HLA, and which is not designed to take into account the HLA rules, interface specification, etc. It is intended to identify those DoD simulations which may require some degree of modification prior to being incorporated into an HLA federation.

**28. Will we continue to support DIS? For how long? Will we add to 2.x standards while DIS++ is being planned?**

ANSWER: Any document submitted and approved as an official IEEE standard has a validity period of five years from the date of approval. At the end of the validity period the document must be revised, reaffirmed by ballot, or withdrawn. The workshop process currently has three documents, IEEE 1278-1993, 1278.1-1995 and 1278.2-1995, which require this nature of support. In addition, the Protocols Working Group currently has under development an extension to IEEE 1278.1-1995. This extension will be completed through the workshop process, and should complete the balloting and IEEE approval

process by mid-year 1997, at which time the five year validity period will begin for this document. The activity in support of maintaining validation of our IEEE standards constitutes one level of continued support for DIS standards needed from the workshop.

The availability of funds (see answer to question number 22) and the support available to transition HLA-legacy systems from DIS to HLA-based systems will define the amount and extent of new DIS standards development that will continue. The requirement is that all ongoing DoD M&S projects will be HLA compliant. DIS++ will develop and maintain the current protocol standards 1) until the DoD applications using them can transition to HLA, and 2) while needed by organizations outside of DoD.

**29. What happens to my current investment in DIS 2.x?**

ANSWER: The global transition from DIS 2.x to an HLA compliant structure will be a process which occurs over time. Depending upon the timetable within the community with which you interact or federate, you may get appreciable benefit out of your investment prior to conversion. Your future investment decisions need to be influenced accordingly.

**30. My company has two very specific purpose type simulators which have been actively used in recent DIS demonstrations and exercises. Will we be excluded from further participation because we do not have, and do not have the internal resources to develop, an RTI interface?**

ANSWER: There will continue to be DIS exercises run during the period of transition. Also, there are DIS to HLA conversions being developed to support DIS and even SIMNET-based federates in the current HLA proto-federations, which suggest that commercial products will become available to ease the transition from DIS to HLA for companies such as yours. See also question 21.

**31. What will happen to all the DIS tools that have been developed (i.e. XCIU, Data loggers, data analysis tools, etc.)? Who will pay to have these converted to HLA?**

ANSWER: Modification of some existing tools and development of new ones has already begun as part of the work within the HLA proto-federations. However, future users of the HLA will continue to have to support the development of the full complement of tools required for HLA, just as they did to support the maturation of DIS. Much of what has been developed for DIS will ease the way for developing similar capabilities to support the HLA.

**32. My simulator is about to start testing by means of the DIS Test Suite. Will there be any significant value in passing the tests of this test suite in the new HLA-based paradigm?**

ANSWER: The primary value will be in the ability it will afford to be able to participate confidently in such DIS exercises as may occur before you are called upon to federate in an HLA environment. Passing the test also provides evidence that your simulator is a candidate for possible inclusion in future HLA federations.

**33. Should I finish my 2.x document?**

ANSWER: DIS has concentrated on real-time virtual and live simulations at the tactical level in the past. DIS++ will expand to serve other communities as well. During the transition period to DIS++, the real-time virtual and live simulations will continue to

operate and can benefit from the DIS 2.x documents currently being developed. In addition, most of these simulations will continue to operate when modified to implement DIS++ principles. Consequently, the information contained in the DIS 2.x documents may be useful in the DIS++ arena.

If a document is near completion, it should be finalized and considered as a resource for the development of DIS++ documents to be started soon. If the document is longer term, then the DIS++ Steering Committee will consider it for expansion and modification to incorporate DIS++ concepts.

## **DIS++**

### **34. What is DIS++? What are the differences between HLA and DIS++? Is DIS++ an implementation of HLA?**

ANSWER: As stated in the registration handout at the 14th Workshop, the name DIS++ has been chosen to communicate the essential objective of expanding the standards development activities to include both the High Level Architecture and other members of the modeling and simulation community. DIS++ refers to the evolution of the DIS standards to cover areas of modeling and simulation identified in the DIS Vision document but not addressed in the current standards (e.g. event driven simulations, analytic models, interfaces to operational systems). HLA is an explicit architecture being developed, and currently owned, by DoD to provide a common framework for the development of all DoD modeling and simulation. To prove that the HLA is a viable concept, DoD is sponsoring the development of prototype implementations of the HLA. See answers to Questions 1, 3, 4, 5, 11, and 12.

DIS++ standards development will be conducted by the standards development organization and processes resulting from implementing the plan prepared by the current Special Task Group for Vision Implementation Plan (STGVIP). The DIS++ standards workshop will assume responsibility for standardization of the main components of the baseline HLA and other standards important to the M&S community as part of the normal standards development process. The DIS++ standards body will also expand the DIS DD/PC (Data Dictionary/Protocol Catalog) to include common data structures needed by DIS++ applications. This expanded product will be called simply the DIS++ Protocol Catalog. See answers to questions 16, 17, 18, 36, and 41.

### **35. Is HLA or DIS++ a protocol?**

ANSWER: HLA is an architecture, defined by an interface specification (with corresponding API), an object model template, and a set of underlying technical principles (rules). DIS++ is a set of standards supporting this architecture. It is envisioned that, during the design and implementation of an HLA federation, certain resources, such as a Protocol Catalog (an extension of the DIS Data Dictionary/Protocol Catalog) will be available through on-line repositories.

### **36. Is DIS 3.0 = HLA? Is there going to be a DIS 3.0?**

ANSWER: There will not be a DIS 3.0, in the sense of another DIS generation between the current 2.x standard and the HLA compliant version. Future evolution of DIS is denoted DIS++. The architecture adopted for DIS++ is HLA.

## **Questions & Comments Related to VIP and Standards**

### **37. Don't you think the stated schedule for reorganization is insane?**

ANSWER: No. The revised organization will undoubtedly evolve over time, and it is important that we START the process soon. With the availability of the HLA baseline definition in August, there is an opportunity to begin work at the September Workshop, and we don't want to miss that opportunity. While the details of transition to DIS++ await the recommendations of the STG VIP, the desire is for a close working relationship between the developers of the HLA and the IEEE standards body.

### **38. Have we given up on the entertainment industry?**

ANSWER: DIS and the entertainment industry have many common interests and this area of commonality is growing. Companies and individuals developing VR (Virtual Reality) applications for the Internet are creating a set of standards called VRML (Virtual Reality Modeling Language) to meet their specific needs. There is an overlap in membership between the VRML and DIS communities. VRML and other entertainment industry speakers have participated in the last two DIS workshops. To make the link between the communities a bit more formal, the DIS Coordinating Committee has invited a member of the VRML Architecture Group, the equivalent of the DIS Steering Committee, to be a member of a panel reviewing DIS++ reorganization plans. DoD is also aggressively pursuing opportunities for cooperation with the entertainment industry.

### **39. Have we backed away from an international standard? Are we targeting ISO with our standards?**

ANSWER: No. DIS continues to consider its objective international standards, and the Modeling and Simulation Master Plan calls for the establishment of international standards (e.g. ISO) in addition to IEEE standards. However, going directly to an ISO standard is a lengthy and costly process. Going first to an IEEE standard creates a "fast path" to an ISO standard. The DDR&E also recently invited liaison within NATO regarding the HLA development process. The HLA products are being made available largely through the Internet, which is international in scope. While there are still certain restrictions (external to the HLA development process) which may restrict the unlimited distribution of certain software components, the goal is to make the HLA as widely available as possible.

### **40. Will we have requisite support for conferences/workshop?**

ANSWER: There is strong support for the involvement of the DIS community in the development of the HLA from the highest levels of the DoD. The evolution from DIS 2.x to DIS++ will actually broaden the base of support for the Workshops, since DoD M&S communities which previously were not strongly supported under DIS 2.x will now have a role. This broadening of scope will call for a reorganization of the structure of the workshops, and this will strengthen the standards process. DMSO intends to continue/enhance its financial support to the DIS standards organization.

### **41. What are the futures of the current workgroups at the workshops?**

ANSWER: The current workgroups are oriented around real-time virtual and live simulations at the tactical level. As we expand our goals to serve a broader modeling and

simulation community, one option is to simply invite members of these communities to join our current working groups. However, many DIS++ concepts do not fit neatly into the current workgroups.

The DIS Steering Committee voted to reorganize the workshops around the products that will be needed to implement DIS++. We will be forming workgroups to standardize these products. Naturally, many DIS 2.x goals will still be goals in DIS++. Consequently, some of the future workgroups will be similar to the current groups but with a broader mission and new participants.

Current workshop participants should rest assured that there will be ample opportunity to volunteer their time and energy and have an impact on the development of DIS++ products.

## **Compliance**

### **42. How do we determine compliance?**

ANSWER: The DoD M&S Master Plan describes compliance in terms of the High Level Architecture (HLA). The AMG is preparing a definition of HLA compliance as part of the baseline definition. The current thought is that HLA compliance deals with how well a federate handles the functions defined in the HLA interface specification, whether it has an object model in conformance with the OMT, and whether it complies with the HLA rules for federates. This is distinct from Federation testing, which is the responsibility of individual federations. See answers to Questions 11 & 12. Corresponding compliance definitions and test procedures will be included as an integral part of DIS++ standards development.

## **Getting Information and Answers**

### **43. How do we get more information?**

ANSWER: Current information about the full range of DoD M&S activities is available on the DMSO home page: <http://www.dmsomil/>. Current information on the status and progress of the HLA development is available from the home page or more directly at <http://www.dmsomil/projects/hla>. These pages contain literally hundreds of pages of information, both in technical documentation and in briefing materials, describing the various aspects of the HLA. At the bottom of most of the DMSO HLA Web pages, there is an e-mail address ([hla@msis.dmsomil](mailto:hla@msis.dmsomil)) for submitting comments or questions about the contents of the pages. This address connects to personnel at DMSO who review the questions and either answer directly, or pass the inquiry to the proper person to provide a response.

Current information about activities conducted by the DIS Standards Workshop is available at the IST Service Center home page: <http://www.sc.ist.ucf.edu/~STDS/>. Information on the status and progress of the Special Task Group Vision Implementation Plan (STGVIP) is available from the home page under Files and Documents (FTP Area with titles.) or more directly at <http://ftp.sc.ist.ucf.edu/STDS/stgvip>. Comments or questions concerning STGVIP reports and activities may be provided using the DIS-STD-

STGVIP reflector. To subscribe to the STGVIP reflector, send an e-mail message to "listproc@sc.ist.ucf.edu". The subject may be anything you wish, but the body of the message MUST have ONLY ONE LINE as follows:

"subscribe DIS-STD-STGVIP First Last"

with your first and last name entered in place of First and Last as shown. Do not include the quotation marks in the address or body of the message.

Aside from face to face presentations at conferences such as the DIS Workshop, the best clearinghouse of information on the HLA and STGVIP activities are these pages and reflectors.